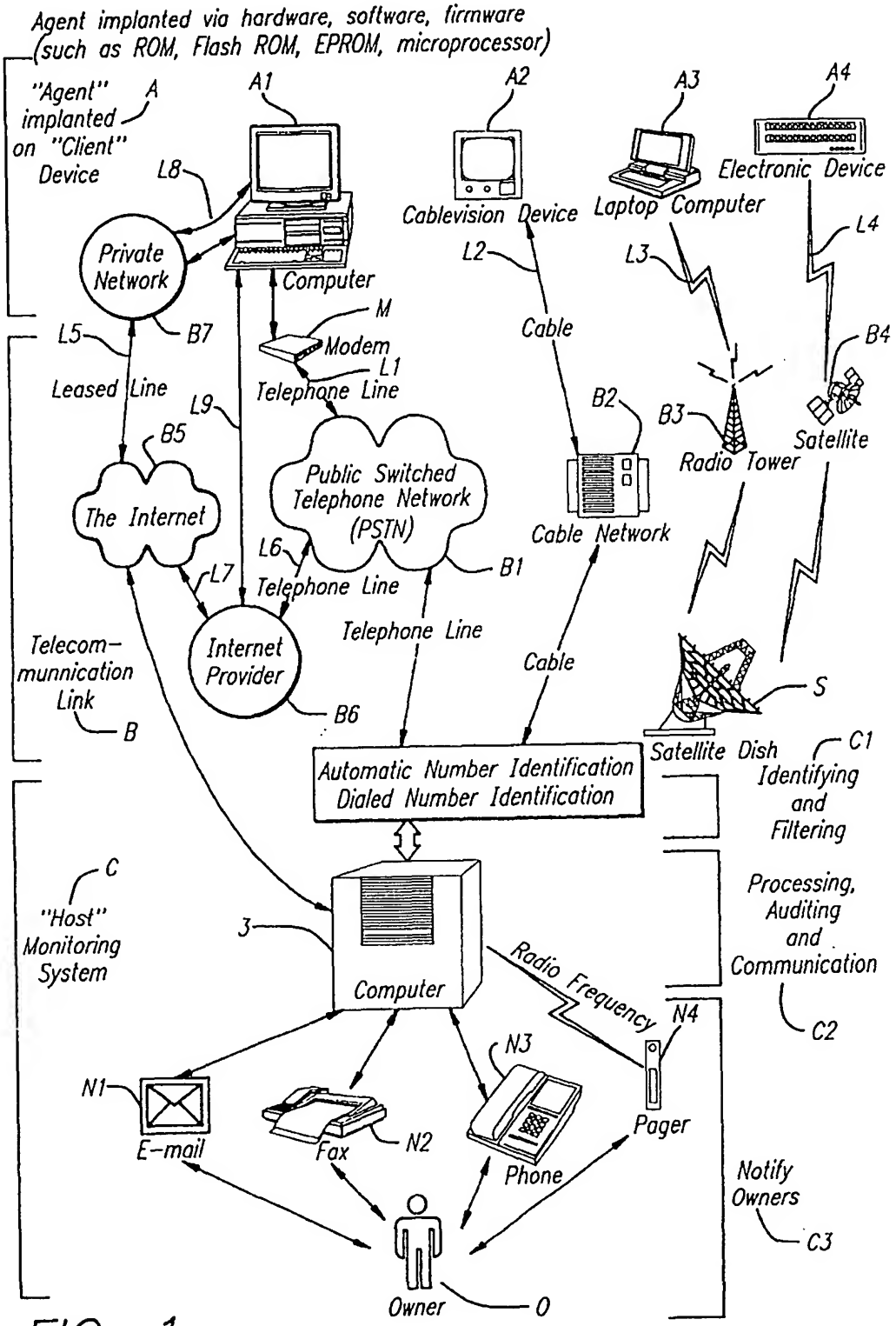

Agent implanted via hardware, software, firmware
(such as ROM, Flash ROM, EPROM, microprocessor)
"Agent" implanted on "Client" Device
A
A1
A2
A3
A4
L8
Cablevision Device
Laptop Computer
Electronic Device
Private Network
Computer
L2
L3
L4
Cable
M
Modem
L1
Telephone Line
L5
B7
Leased Line
L9
B5
B2
B3
B4
Satellite
Radio Tower
Public Switched Telephone Network (PSTN)
The Internet
Cable Network
L6
L7
B1
Telephone Line
Telephone Line
Cable
Telecom-munnication Link
B
Internet Provider
B6
S
Satellite Dish
C1
Identifying and Filtering
Automatic Number Identification
Dialed Number Identification
C
"Host" Monitoring System
3
Computer
Radio Frequency
N4
Processing, Auditing and Communication
C2
N1
N3
E-mail
Fax
N2
Phone
Pager
Notify Owners
C3
Owner
O

FIG. 1

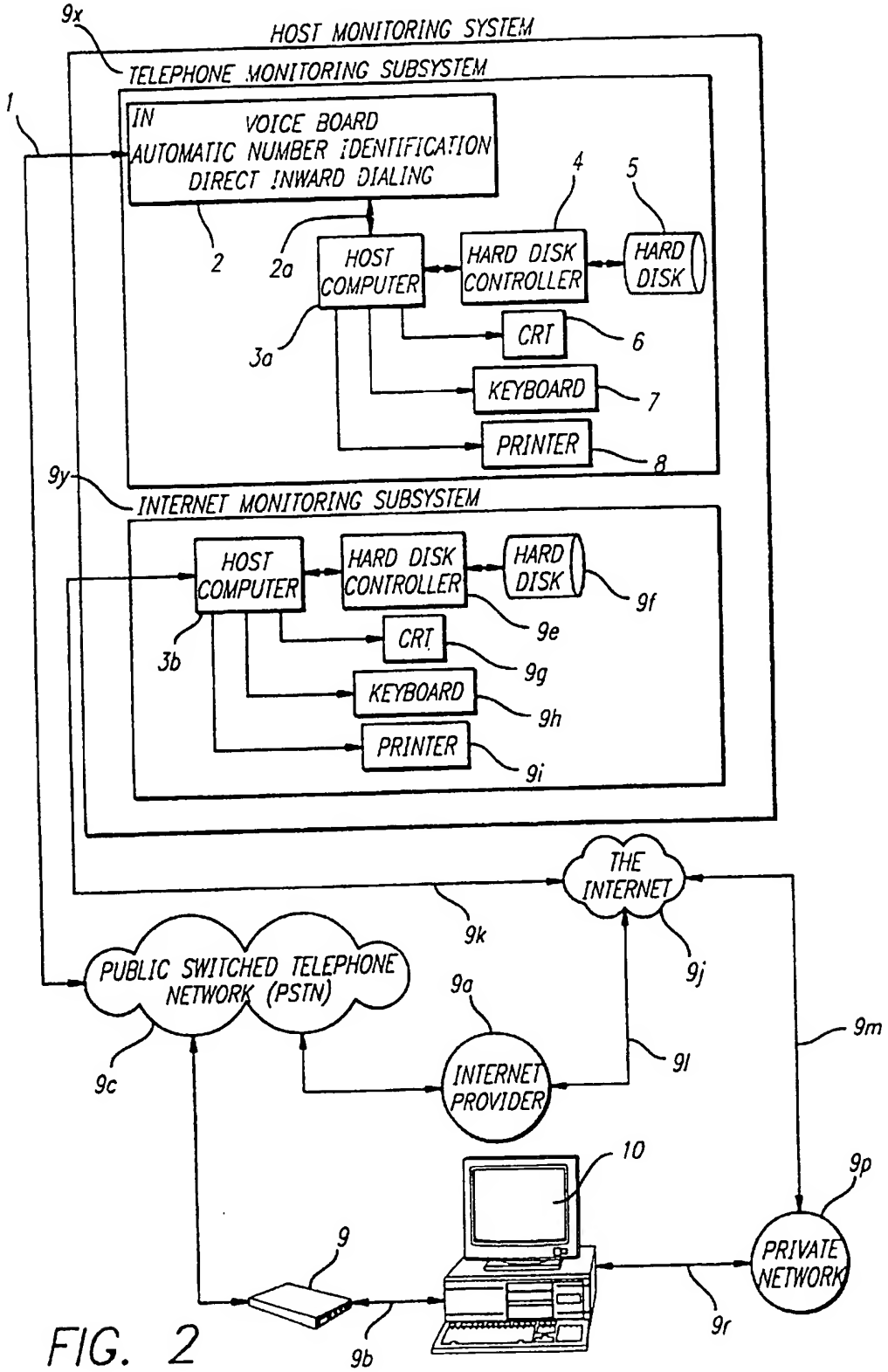

9x
HOST MONITORING SYSTEM
TELEPHONE MONITORING SUBSYSTEM
1
IN VOICE BOARD
AUTOMATIC NUMBER IDENTIFICATION
DIRECT INWARD DIALING
2
2a
HOST COMPUTER
HARD DISK CONTROLLER
4
HARD DISK
5
CRT
6
3a
KEYBOARD
7
PRINTER
8
9y
INTERNET MONITORING SUBSYSTEM
HOST COMPUTER
HARD DISK CONTROLLER
HARD DISK
9f
9e
CRT
9g
3b
KEYBOARD
9h
PRINTER
9i
THE INTERNET
9k
9j
PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)
9a
9m
9c
INTERNET PROVIDER
9l
10
9p
9
PRIVATE NETWORK
9r
9b

FIG. 2

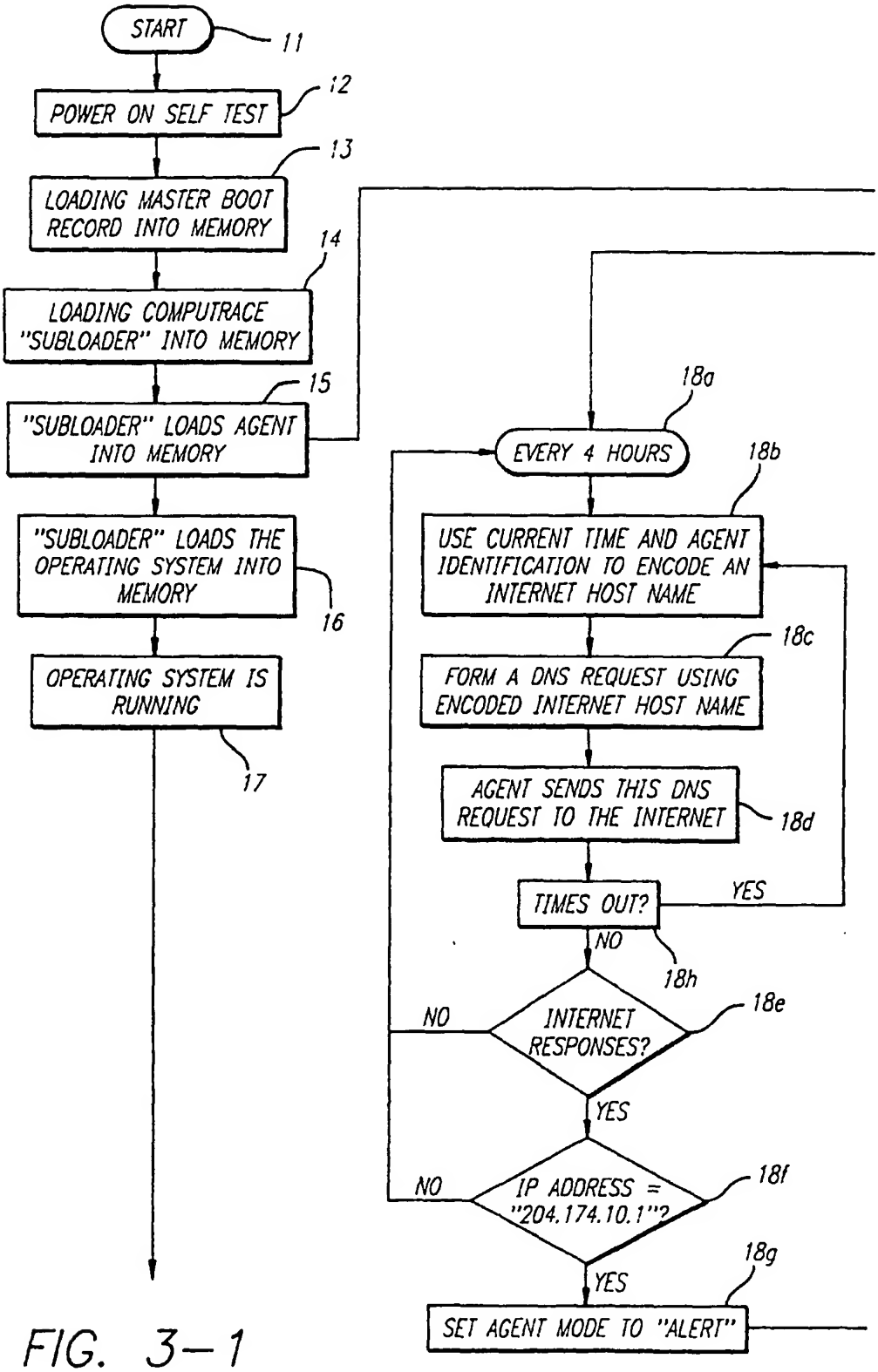

START
11
POWER ON SELF TEST
12
LOADING MASTER BOOT RECORD INTO MEMORY
13
LOADING COMPUTRACE "SUBLOADER" INTO MEMORY
14
"SUBLOADER" LOADS AGENT INTO MEMORY
15
"SUBLOADER" LOADS THE OPERATING SYSTEM INTO MEMORY
16
OPERATING SYSTEM IS RUNNING
17
EVERY 4 HOURS
18a
USE CURRENT TIME AND AGENT IDENTIFICATION TO ENCODE AN INTERNET HOST NAME
18b
FORM A DNS REQUEST USING ENCODED INTERNET HOST NAME
18c
AGENT SENDS THIS DNS REQUEST TO THE INTERNET
18d
TIMES OUT?
YES
NO
18h
INTERNET RESPONSES?
18e
NO
YES
IP ADDRESS = "204.174.10.1"?
18f
NO
YES
SET AGENT MODE TO "ALERT"
18g

FIG. 3-1

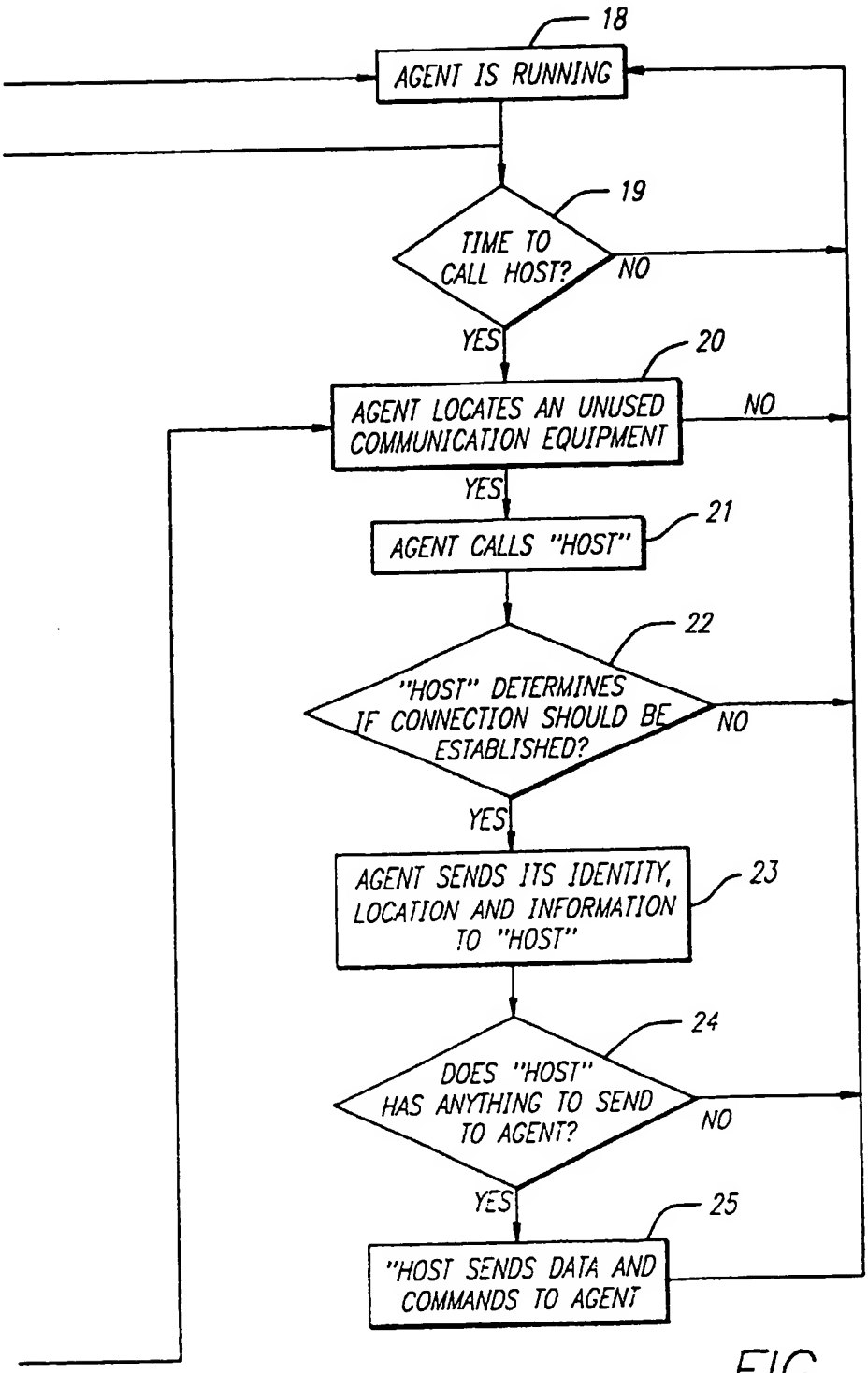

18
AGENT IS RUNNING
19
TIME TO CALL HOST?
NO
YES
20
AGENT LOCATES AN UNUSED COMMUNICATION EQUIPMENT
NO
YES
21
AGENT CALLS "HOST"
22
"HOST" DETERMINES IF CONNECTION SHOULD BE ESTABLISHED?
NO
YES
AGENT SENDS ITS IDENTITY, LOCATION AND INFORMATION TO "HOST"
23
24
DOES "HOST" HAS ANYTHING TO SEND TO AGENT?
NO
YES
25
"HOST SENDS DATA AND COMMANDS TO AGENT

FIG. 3-2

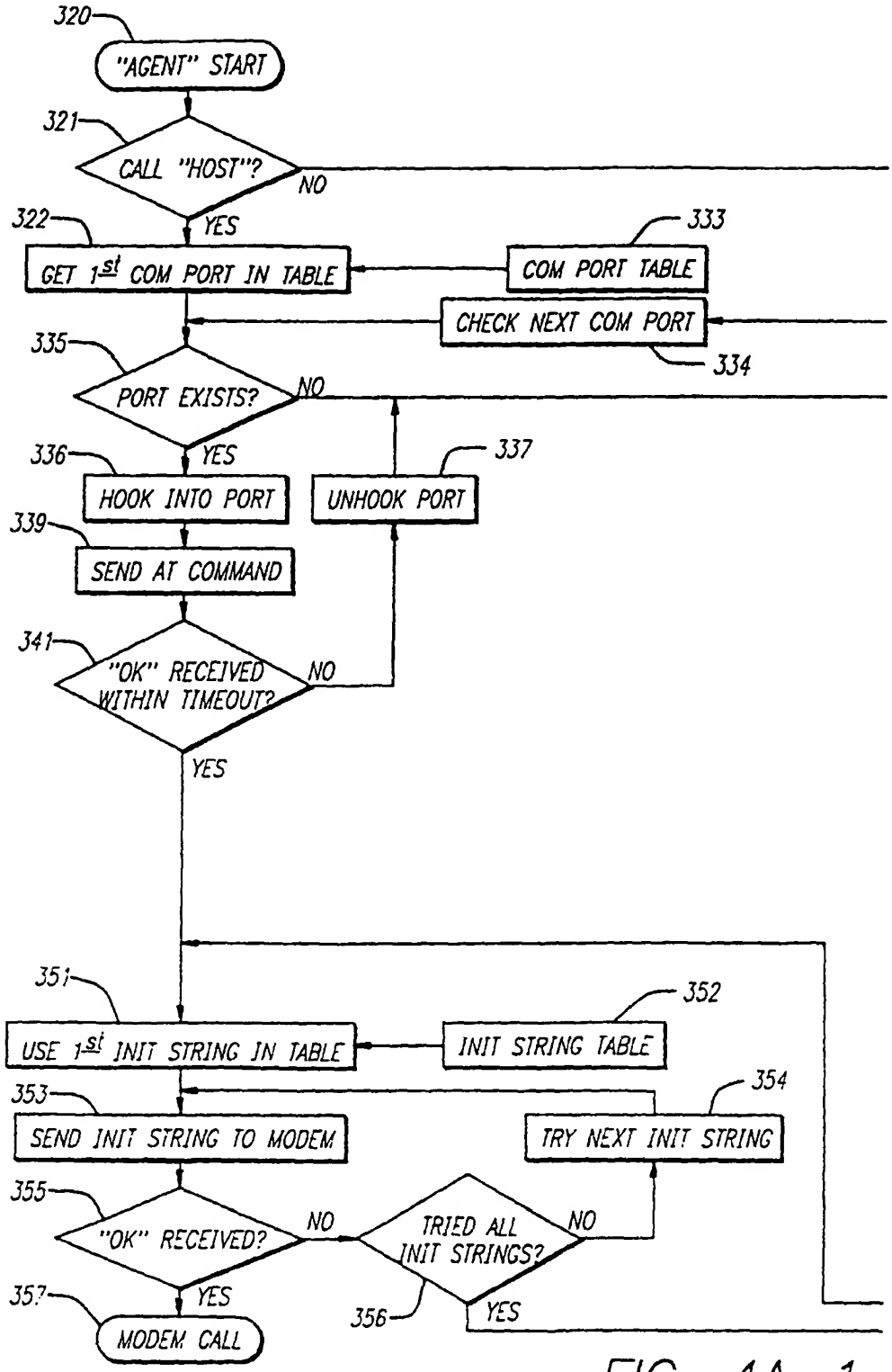
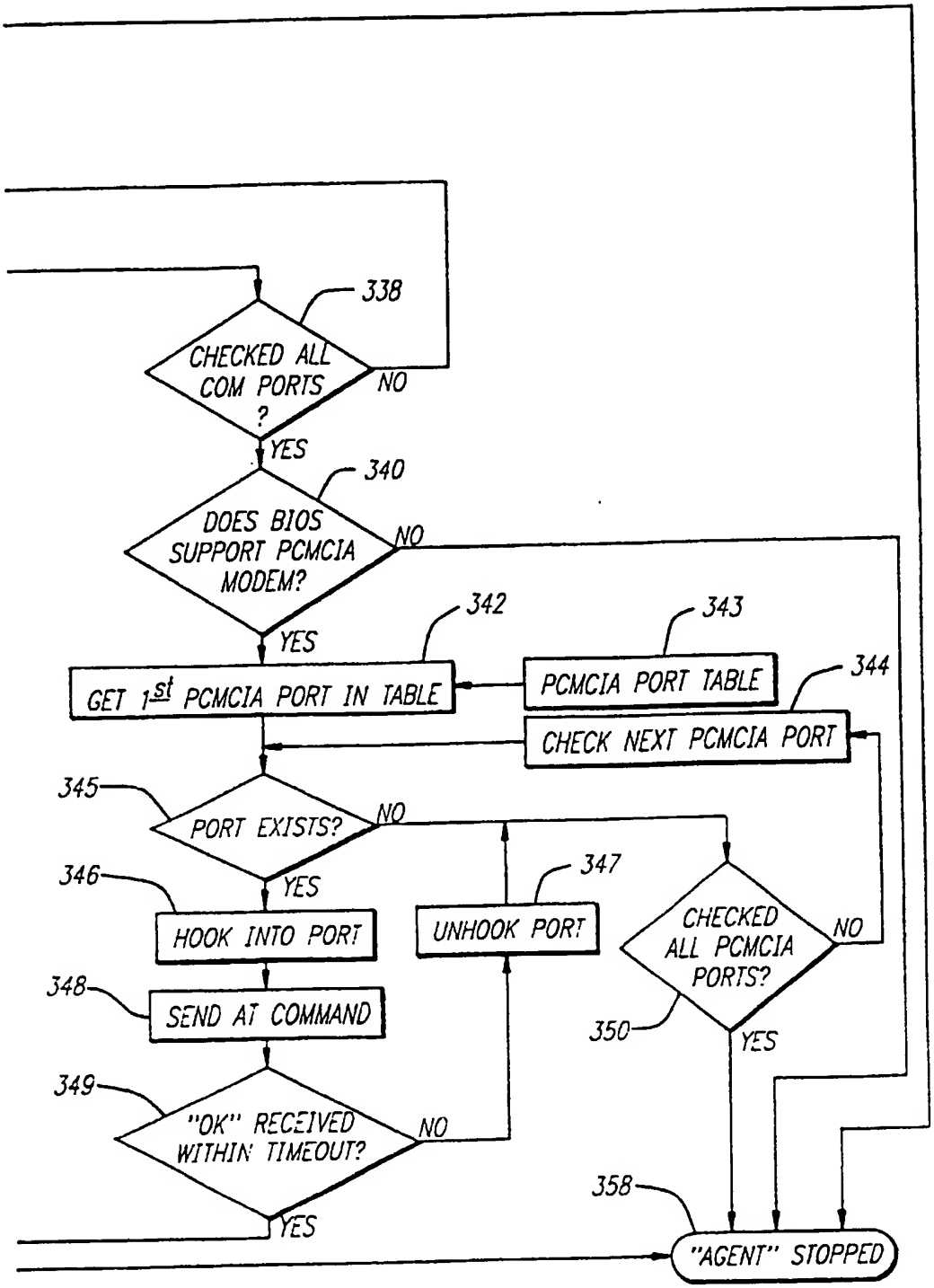

320
"AGENT" START
321
CALL "HOST"?
NO
YES
322
GET 1st COM PORT IN TABLE
333
COM PORT TABLE
CHECK NEXT COM PORT
334
335
PORT EXISTS?
NO
YES
336
HOOK INTO PORT
337
UNHOOK PORT
339
SEND AT COMMAND
341
"OK" RECEIVED WITHIN TIMEOUT?
NO
YES
351
USE 1st INIT STRING IN TABLE
352
INIT STRING TABLE
353
SEND INIT STRING TO MODEM
354
TRY NEXT INIT STRING
355
"OK" RECEIVED?
NO
TRIED ALL INIT STRINGS?
NO
YES
356
YES
357
MODEM CALL

FIG. 4A-1

FIG. 4A-2


338
CHECKED ALL COM PORTS ?
NO
YES
340
DOES BIOS SUPPORT PCMCIA MODEM?
NO
YES
342
343
344
GET 1st PCMCIA PORT IN TABLE
PCMCIA PORT TABLE
CHECK NEXT PCMCIA PORT
345
PORT EXISTS?
NO
YES
346
HOOK INTO PORT
347
UNHOOK PORT
CHECKED ALL PCMCIA PORTS?
NO
YES
350
348
SEND AT COMMAND
349
"OK" RECEIVED WITHIN TIMEOUT?
NO
YES
358
"AGENT" STOPPED

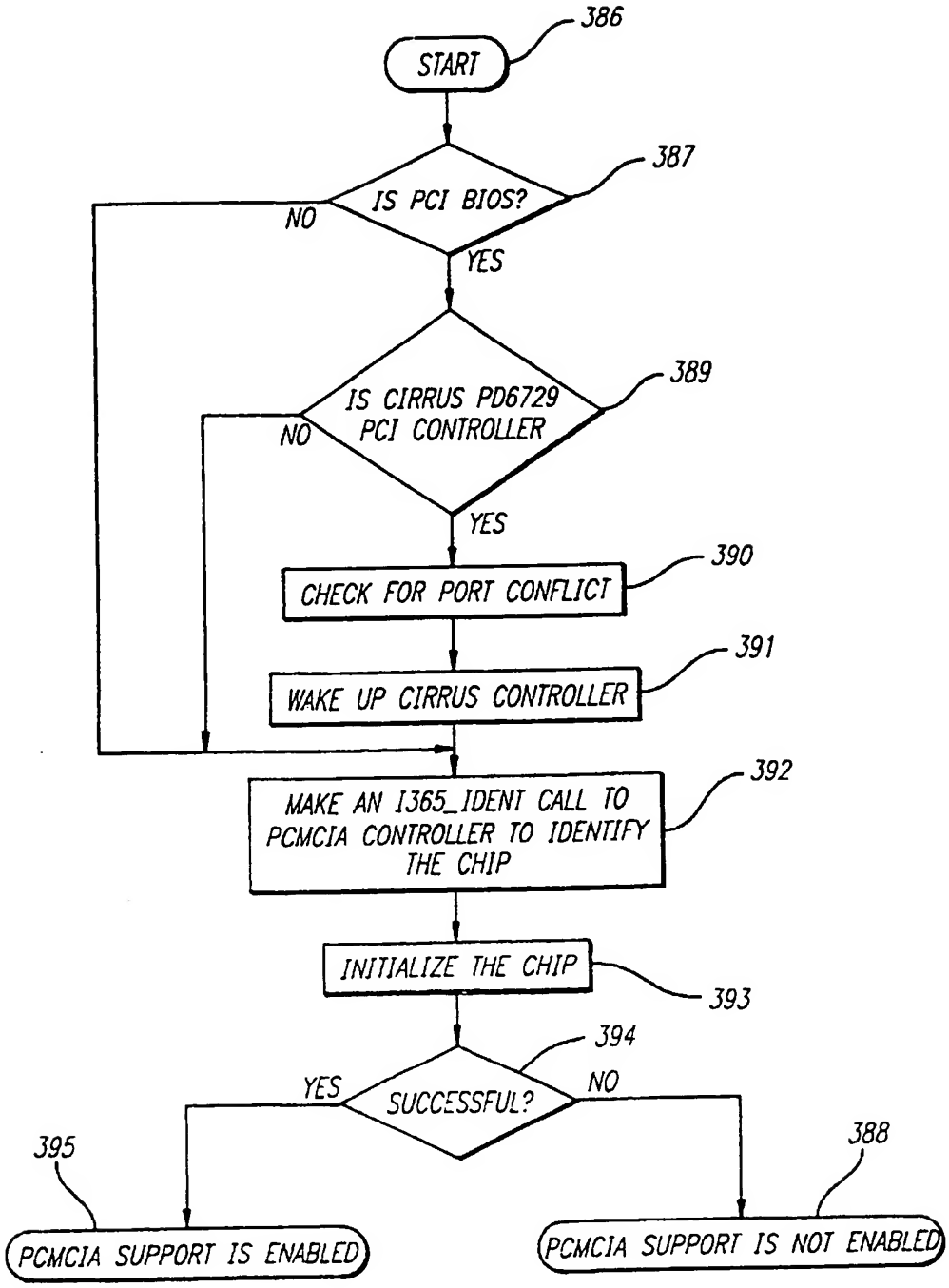

386
START
387
IS PCI BIOS?
NO
YES
389
IS CIRRUS PD6729 PCI CONTROLLER
NO
YES
390
CHECK FOR PORT CONFLICT
391
WAKE UP CIRRUS CONTROLLER
392
MAKE AN I365_IDENT CALL TO PCMCIA CONTROLLER TO IDENTIFY THE CHIP
INITIALIZE THE CHIP
393
394
YES
SUCCESSFUL?
NO
395
388
PCMCIA SUPPORT IS ENABLED
PCMCIA SUPPORT IS NOT ENABLED

FIG. 4B

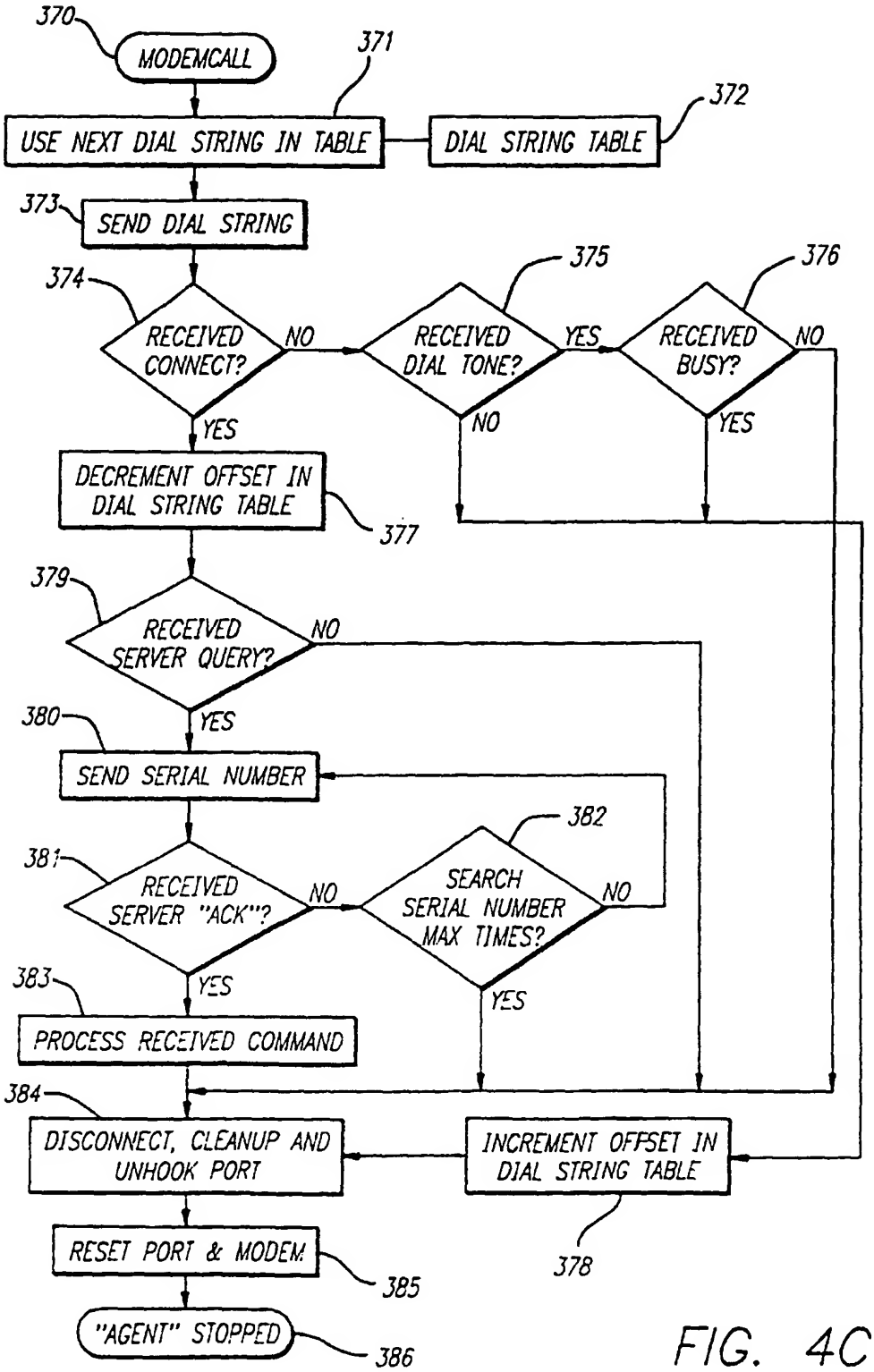

370
MODEMCALL
371
USE NEXT DIAL STRING IN TABLE
372
DIAL STRING TABLE
373
SEND DIAL STRING
374
RECEIVED CONNECT?
NO
375
RECEIVED DIAL TONE?
YES
376
RECEIVED BUSY?
NO
YES
NO
YES
DECREMENT OFFSET IN DIAL STRING TABLE
377
379
RECEIVED SERVER QUERY?
NO
YES
380
SEND SERIAL NUMBER
382
381
RECEIVED SERVER "ACK"?
NO
SEARCH SERIAL NUMBER MAX TIMES?
NO
YES
YES
383
PROCESS RECEIVED COMMAND
384
DISCONNECT, CLEANUP AND UNHOOK PORT
INCREMENT OFFSET IN DIAL STRING TABLE
378
RESET PORT & MODEM
385
"AGENT" STOPPED
386

FIG. 4C

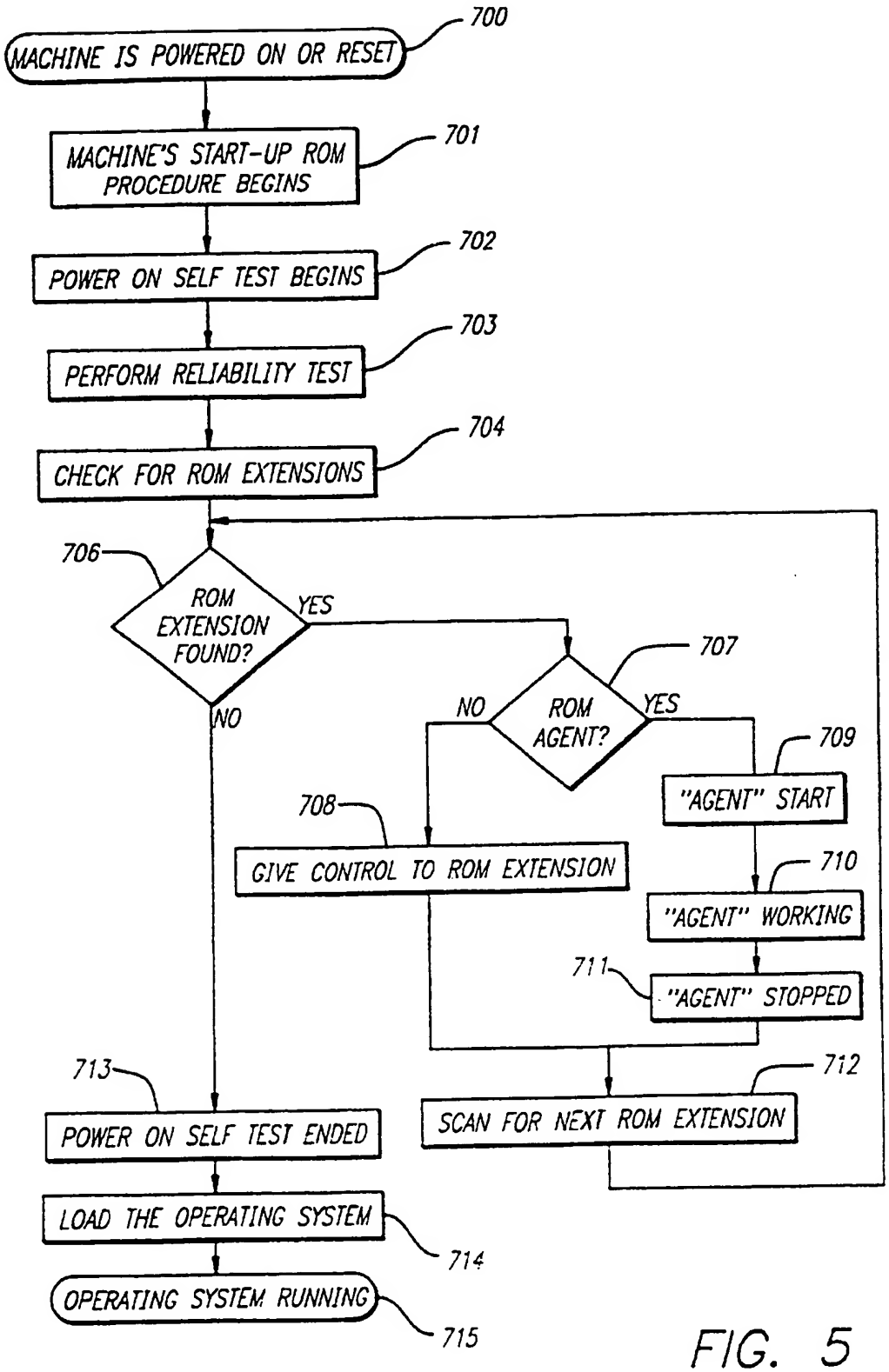
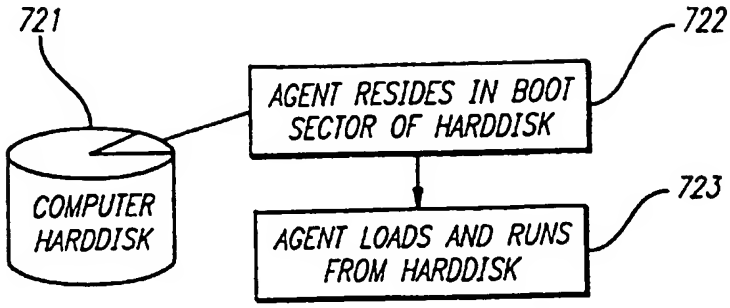

700
MACHINE IS POWERED ON OR RESET
701
MACHINE'S START-UP ROM PROCEDURE BEGINS
702
POWER ON SELF TEST BEGINS
703
PERFORM RELIABILITY TEST
704
CHECK FOR ROM EXTENSIONS
706
ROM EXTENSION FOUND?
YES
NO
707
ROM AGENT?
NO
YES
708
GIVE CONTROL TO ROM EXTENSION
709
"AGENT" START
710
"AGENT" WORKING
711
"AGENT" STOPPED
712
SCAN FOR NEXT ROM EXTENSION
713
POWER ON SELF TEST ENDED
LOAD THE OPERATING SYSTEM
714
OPERATING SYSTEM RUNNING
715

FIG. 5


721
722
AGENT RESIDES IN BOOT SECTOR OF HARDDISK
COMPUTER HARDDISK
723
AGENT LOADS AND RUNS FROM HARDDISK

6A

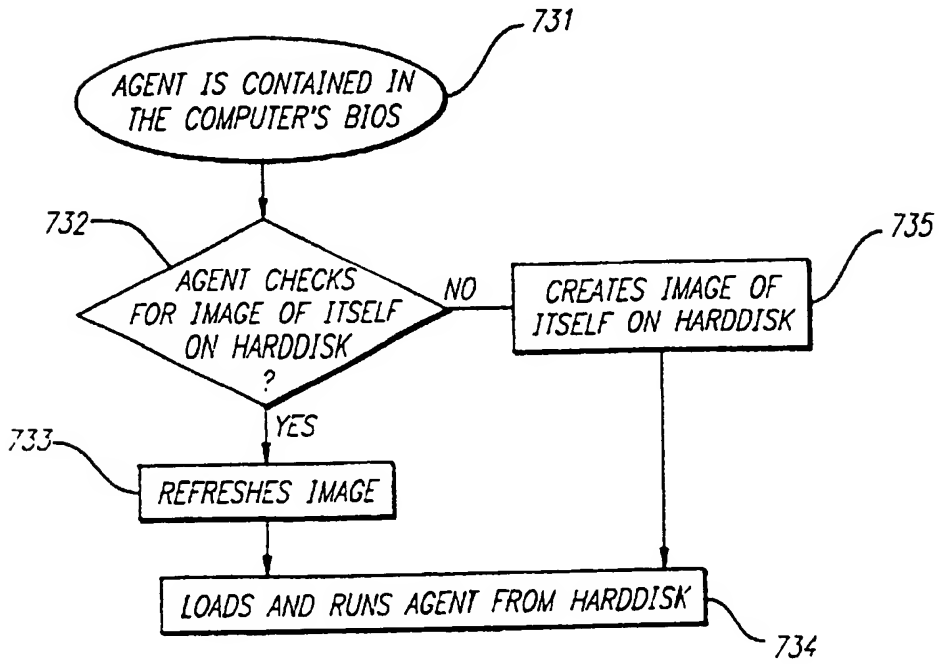

731
AGENT IS CONTAINED IN THE COMPUTER'S BIOS
732
AGENT CHECKS FOR IMAGE OF ITSELF ON HARDDISK ?
NO
735
CREATES IMAGE OF ITSELF ON HARDDISK
YES
733
REFRESHES IMAGE
LOADS AND RUNS AGENT FROM HARDDISK
734

FIG. 6C

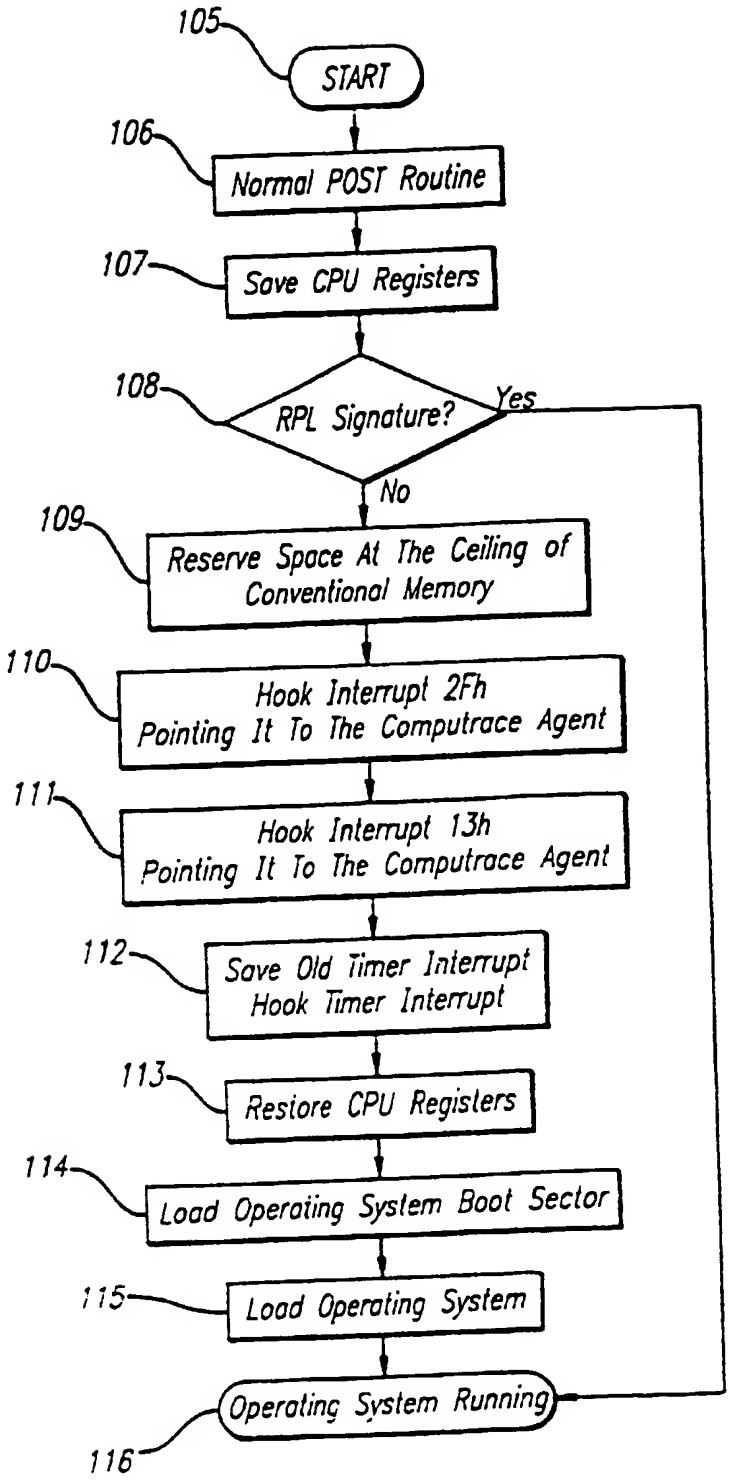

105
START
106
Normal POST Routine
107
Save CPU Registers
108
RPL Signature?
Yes
No
109
Reserve Space At The Ceiling of Conventional Memory
110
Hook Interrupt 2Fh Pointing It To The Computrace Agent
111
Hook Interrupt 13h Pointing It To The Computrace Agent
112
Save Old Timer Interrupt Hook Timer Interrupt
113
Restore CPU Registers
114
Load Operating System Boot Sector
115
Load Operating System
Operating System Running
116

FIG. 6B

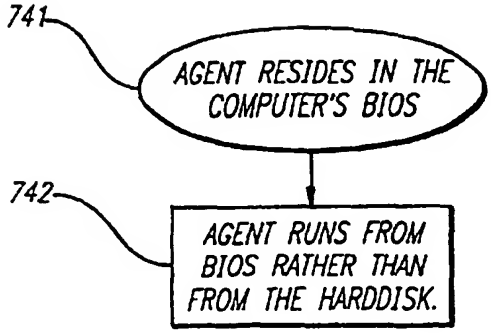

741
AGENT RESIDES IN THE COMPUTER'S BIOS
742
AGENT RUNS FROM BIOS RATHER THAN FROM THE HARDDISK.

FIG. 6D

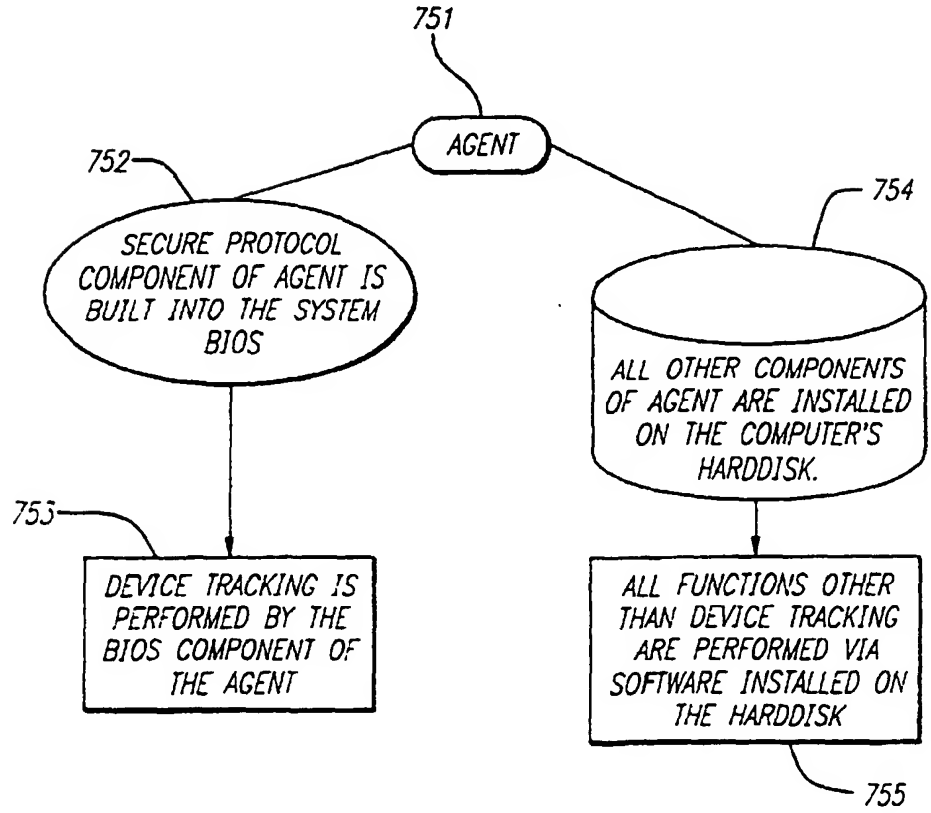

751
AGENT
752
SECURE PROTOCOL COMPONENT OF AGENT IS BUILT INTO THE SYSTEM BIOS
754
ALL OTHER COMPONENTS OF AGENT ARE INSTALLED ON THE COMPUTER'S HARDDISK.
753
DEVICE TRACKING IS PERFORMED BY THE BIOS COMPONENT OF THE AGENT
ALL FUNCTIONS OTHER THAN DEVICE TRACKING ARE PERFORMED VIA SOFTWARE INSTALLED ON THE HARDDISK
755

FIG. 7A

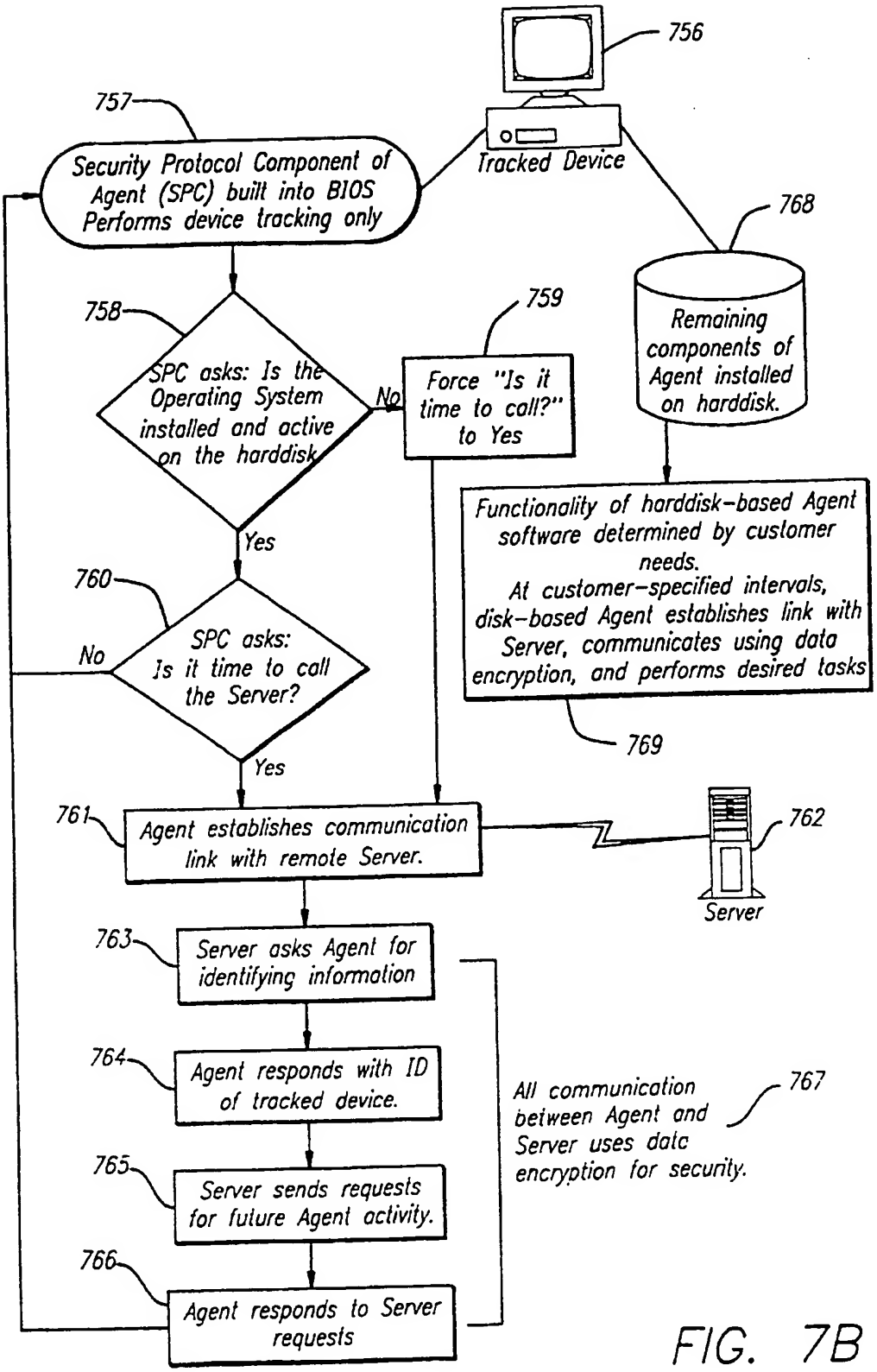

756
757
Security Protocol Component of Agent (SPC) built into BIOS Performs device tracking only
Tracked Device
768
Remaining components of Agent installed on harddisk.
758
SPC asks: Is the Operating System installed and active on the harddisk
No
759
Force "Is it time to call?" to Yes
Yes
Functionality of harddisk-based Agent software determined by customer needs.
At customer-specified intervals, disk-based Agent establishes link with Server, communicates using data encryption, and performs desired tasks
769
760
SPC asks: Is it time to call the Server?
No
Yes
761
Agent establishes communication link with remote Server.
762
Server
763
Server asks Agent for identifying information
764
Agent responds with ID of tracked device.
765
Server sends requests for future Agent activity.
766
Agent responds to Server requests
All communication between Agent and Server uses data encryption for security.
767

FIG. 7B

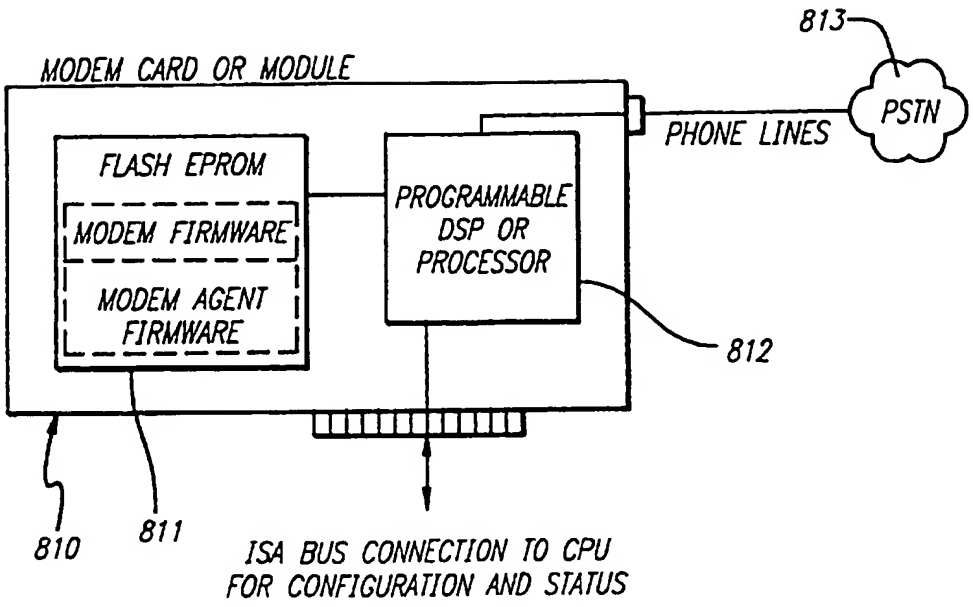

813
MODEM CARD OR MODULE
PSTN
PHONE LINES
FLASH EPROM
MODEM FIRMWARE
MODEM AGENT FIRMWARE
PROGRAMMABLE DSP OR PROCESSOR
812
810
811
ISA BUS CONNECTION TO CPU FOR CONFIGURATION AND STATUS

FIG. 8A

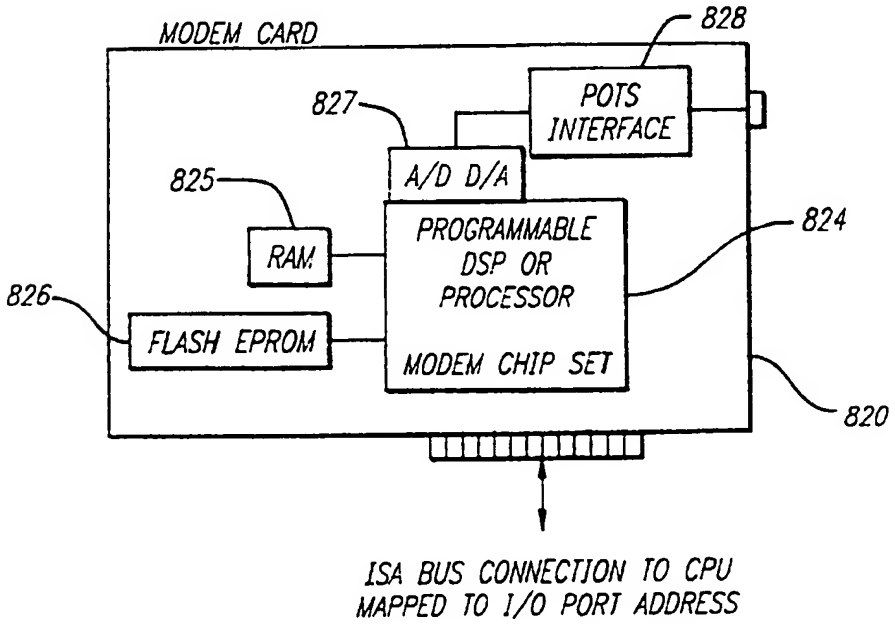

MODEM CARD
828
POTS INTERFACE
827
A/D D/A
825
RAM
PROGRAMMABLE DSP OR PROCESSOR
824
826
FLASH EPROM
MODEM CHIP SET
820
ISA BUS CONNECTION TO CPU MAPPED TO I/O PORT ADDRESS

FIG. 8B

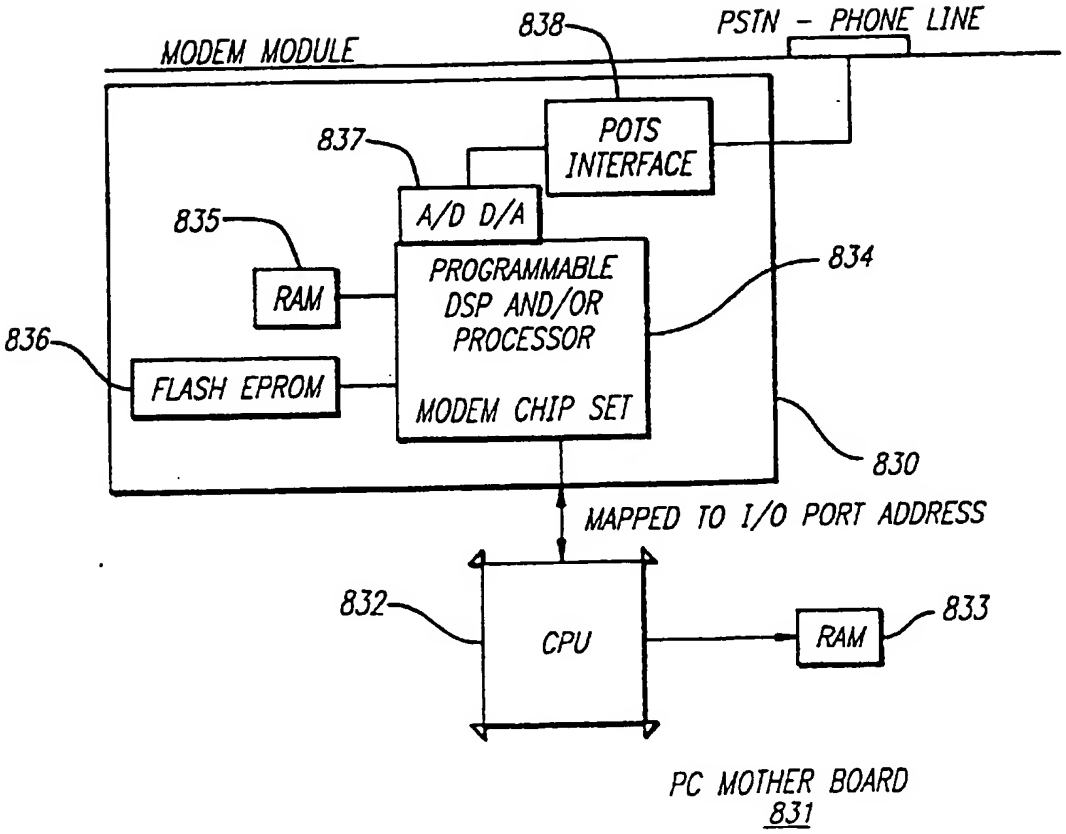

MODEM MODULE
838
PSTN – PHONE LINE
POTS INTERFACE
837
A/D D/A
835
RAM
PROGRAMMABLE DSP AND/OR PROCESSOR
834
836
FLASH EPROM
MODEM CHIP SET
830
MAPPED TO I/O PORT ADDRESS
832
CPU
RAM
833
PC MOTHER BOARD
831

FIG. 8C

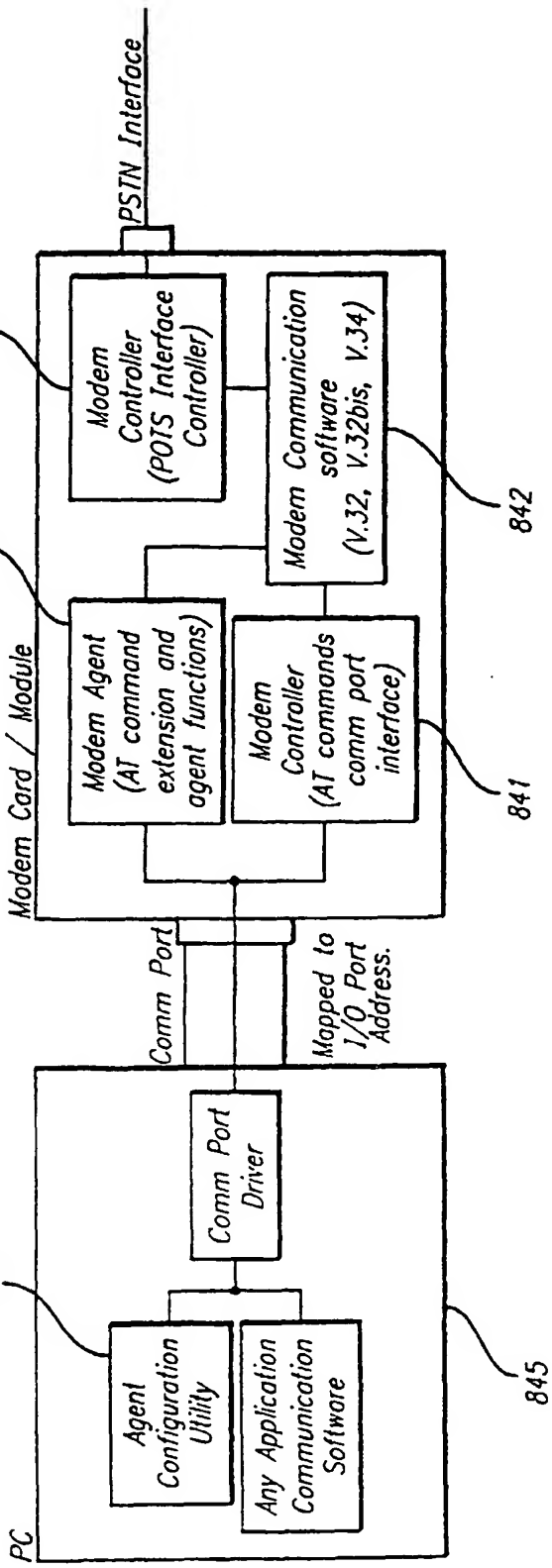

PSTN Interface
844
Modem Controller (POTS Interface Controller)
Modem Communication software (V.32, V.32bis, V.34)
842
843
Modem Agent (AT command extension and agent functions)
Modem Controller (AT commands comm port interface)
841
Modem Card / Module
Comm Port
Mapped to I/O Port Address.
Comm Port Driver
846
Agent Configuration Utility
Any Application Communication Software
845
PC

FIG. 8D

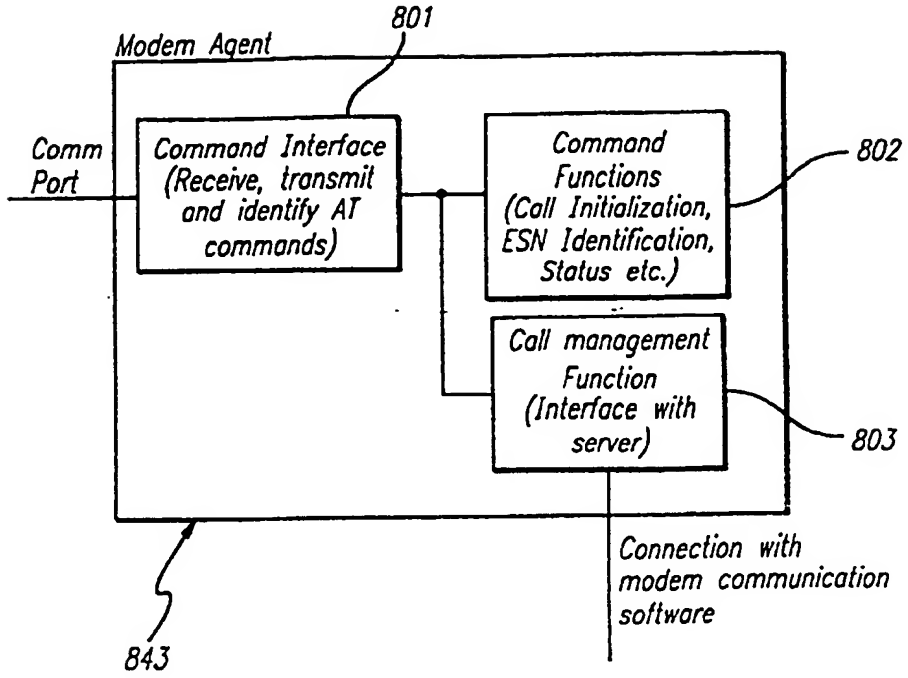

801
Modem Agent
Comm Port
Command Interface (Receive, transmit and identify AT commands)
Command Functions (Call Initialization, ESN Identification, Status etc.)
802
Call management Function (Interface with server)
803
Connection with modem communication software
843

FIG. 8E

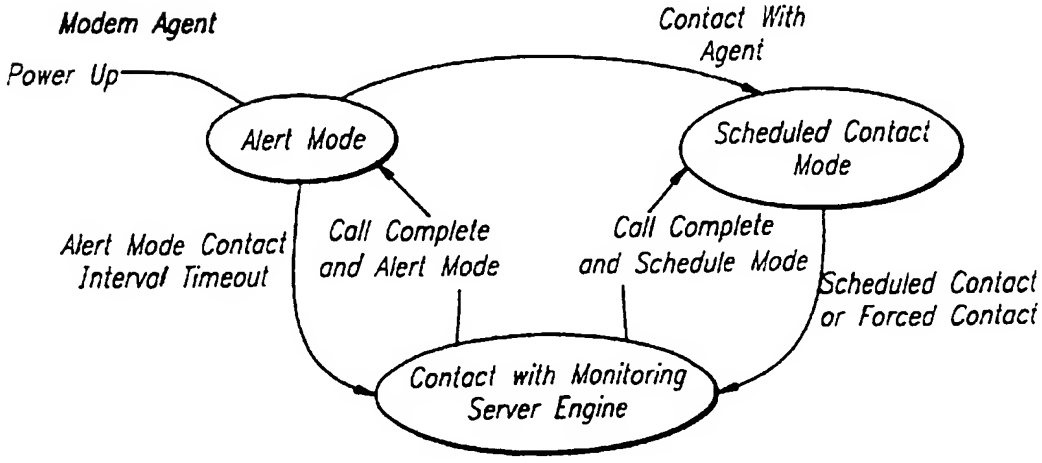

Modem Agent
Power Up
Contact With Agent
Alert Mode
Scheduled Contact Mode
Alert Mode Contact Interval Timeout
Call Complete and Alert Mode
Call Complete and Schedule Mode
Scheduled Contact or Forced Contact
Contact with Monitoring Server Engine

FIG. 8F

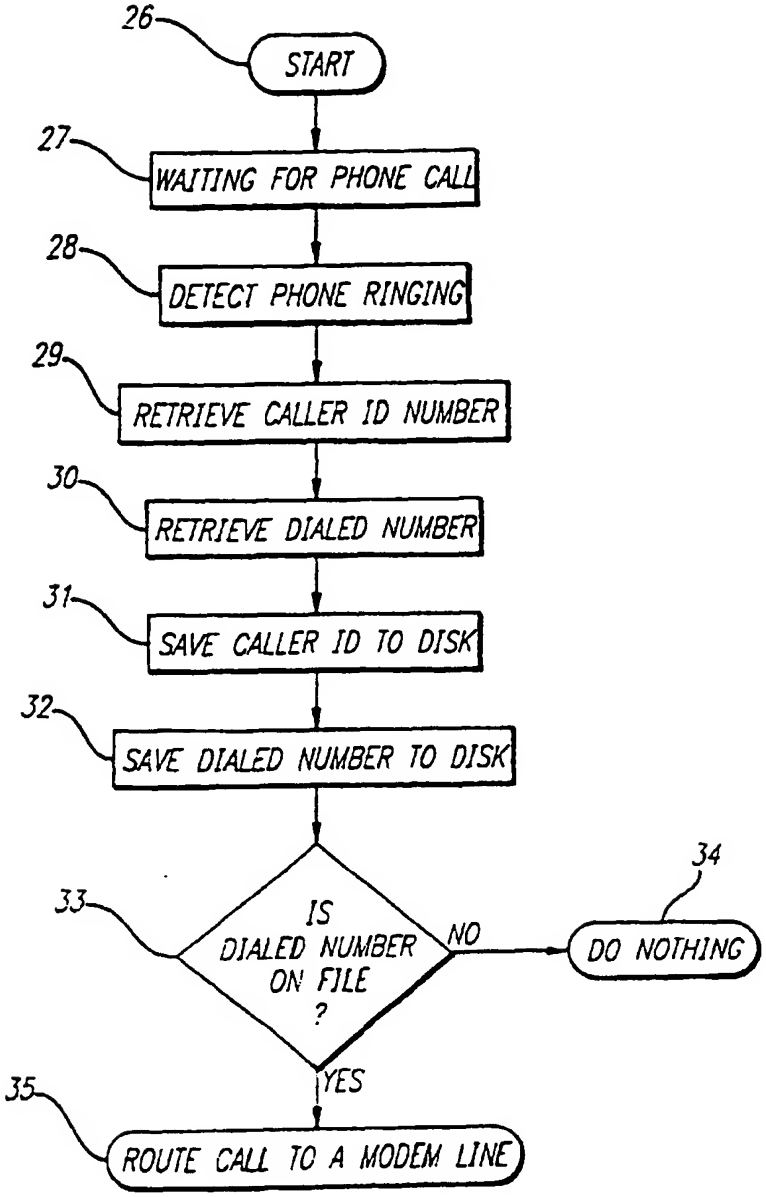

26
START
27
WAITING FOR PHONE CALL
28
DETECT PHONE RINGING
29
RETRIEVE CALLER ID NUMBER
30
RETRIEVE DIALED NUMBER
31
SAVE CALLER ID TO DISK
32
SAVE DIALED NUMBER TO DISK
33
IS DIALED NUMBER ON FILE ?
NO
34
DO NOTHING
YES
35
ROUTE CALL TO A MODEM LINE

FIG. 9

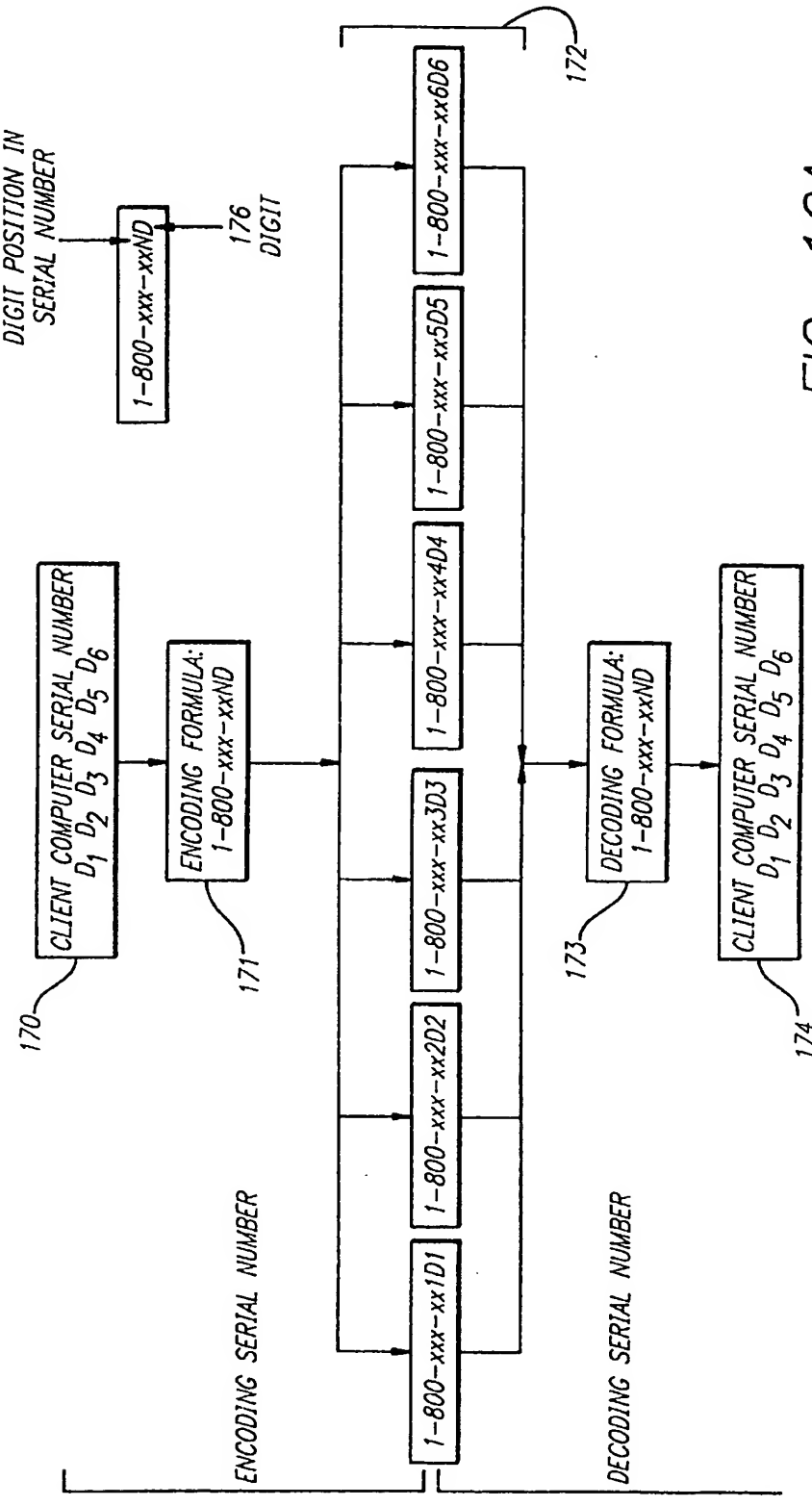

175
DIGIT POSITION IN SERIAL NUMBER
1-800-xxx-xxND
176
DIGIT
172
1-800-xxx-xx6D6
1-800-xxx-xx5D5
1-800-xxx-xx4D4
1-800-xxx-xx3D3
1-800-xxx-xx2D2
1-800-xxx-xx1D1
CLIENT COMPUTER SERIAL NUMBER
D1 D2 D3 D4 D5 D6
170
ENCODING FORMULA:
1-800-xxx-xxND
171
ENCODING SERIAL NUMBER
DECODING FORMULA:
1-800-xxx-xxND
173
CLIENT COMPUTER SERIAL NUMBER
D1 D2 D3 D4 D5 D6
174
DECODING SERIAL NUMBER

FIG. 10A

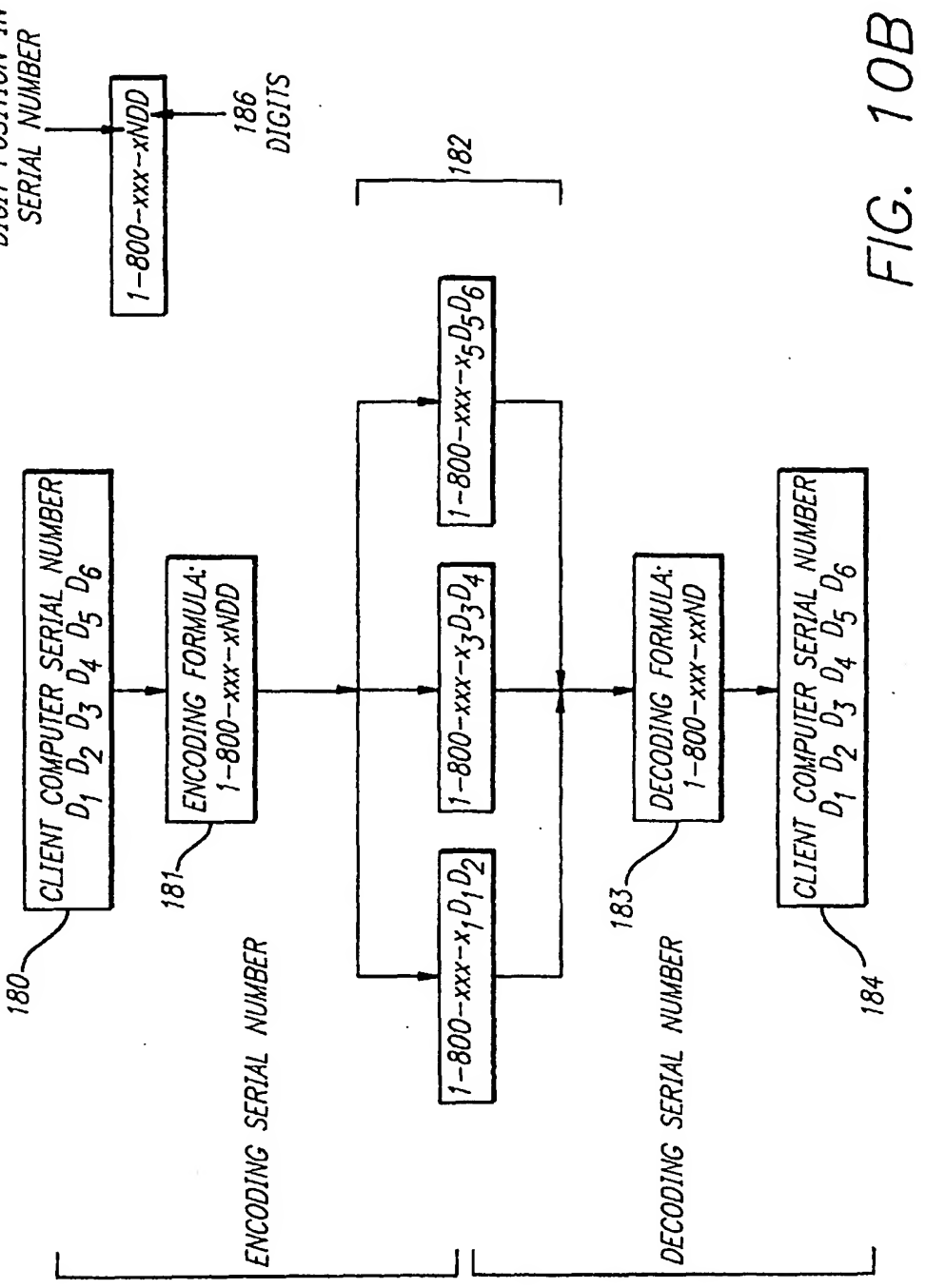

185
DIGIT POSITION IN SERIAL NUMBER
1-800-xxx-xNDD
186
DIGITS
182
CLIENT COMPUTER SERIAL NUMBER
D_1 D_2 D_3 D_4 D_5 D_6
180
ENCODING FORMULA:
1-800-xxx-xNDD
181
1-800-xxx-$x_1D_1D_2$
1-800-xxx-$x_3D_3D_4$
1-800-xxx-$x_5D_5D_6$
ENCODING SERIAL NUMBER
DECODING FORMULA:
1-800-xxx-xxND
183
CLIENT COMPUTER SERIAL NUMBER
D_1 D_2 D_3 D_4 D_5 D_6
184
DECODING SERIAL NUMBER

FIG. 10B

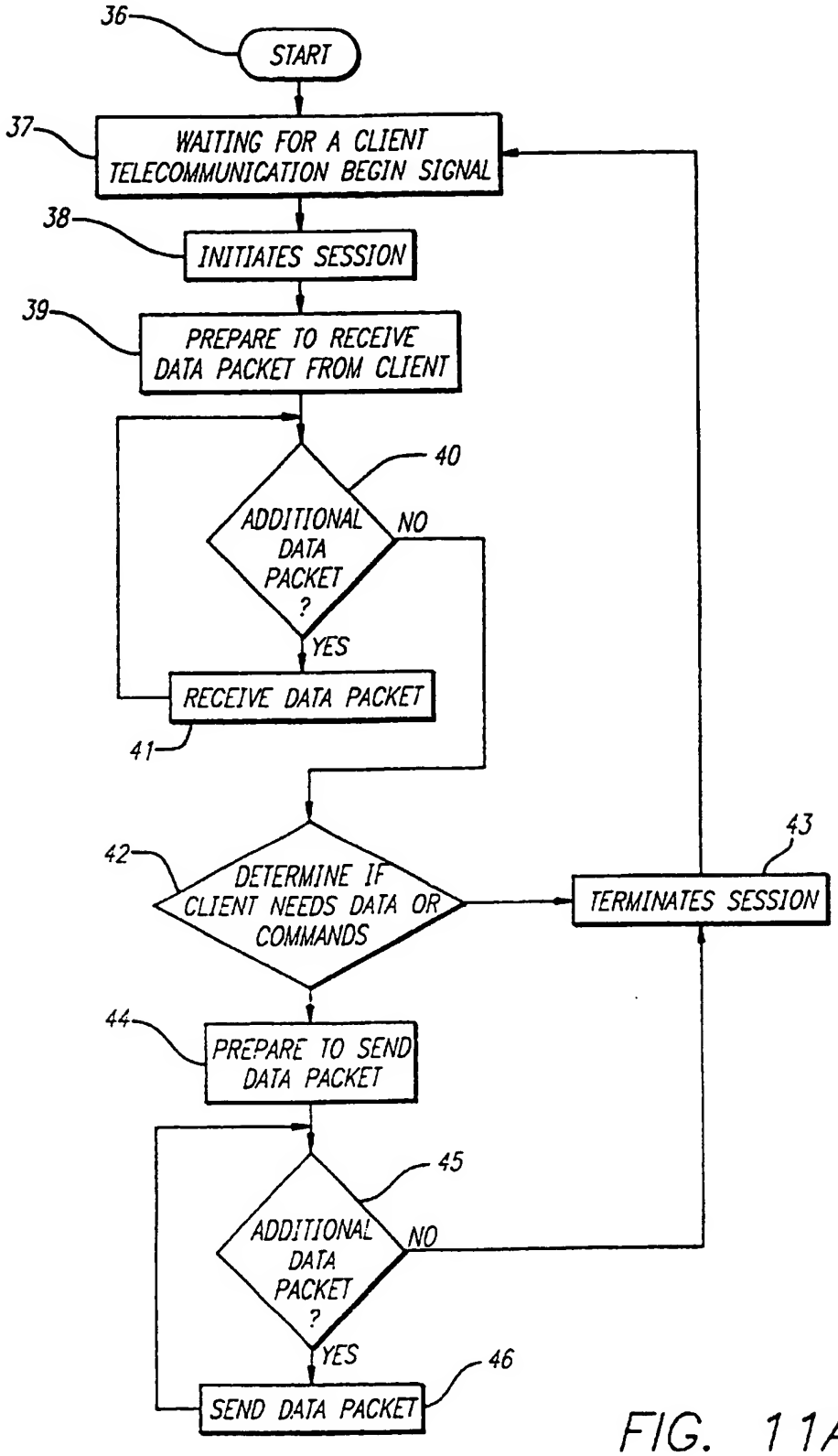
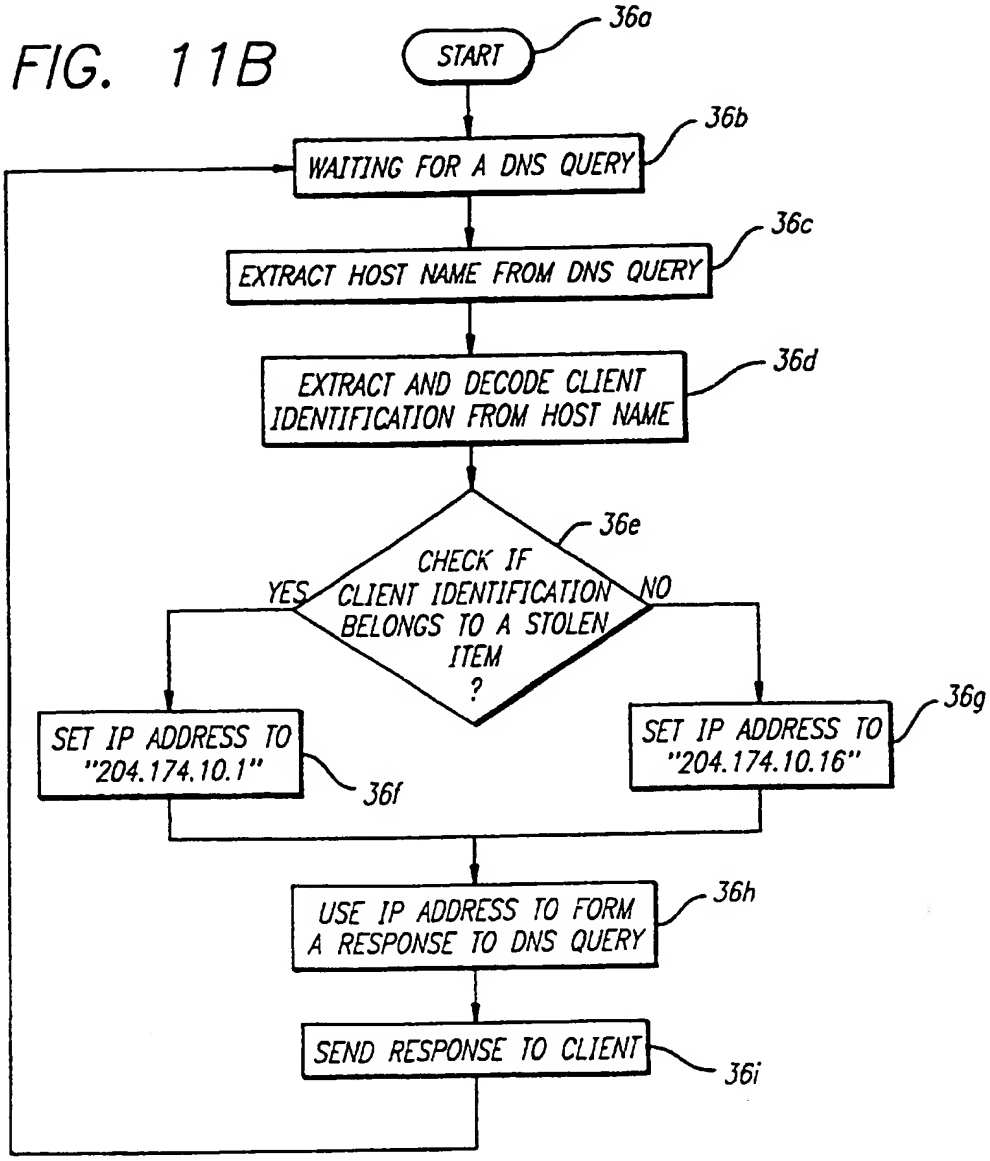
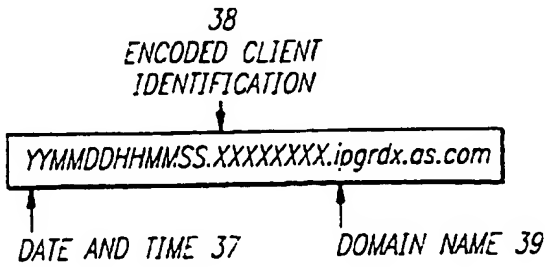

36
START
37
WAITING FOR A CLIENT TELECOMMUNICATION BEGIN SIGNAL
38
INITIATES SESSION
39
PREPARE TO RECEIVE DATA PACKET FROM CLIENT
40
ADDITIONAL DATA PACKET ?
NO
YES
RECEIVE DATA PACKET
41
42
DETERMINE IF CLIENT NEEDS DATA OR COMMANDS
43
TERMINATES SESSION
44
PREPARE TO SEND DATA PACKET
45
ADDITIONAL DATA PACKET ?
NO
YES
46
SEND DATA PACKET

FIG. 11A

FIG. 11B


START
36a
WAITING FOR A DNS QUERY
36b
EXTRACT HOST NAME FROM DNS QUERY
36c
EXTRACT AND DECODE CLIENT IDENTIFICATION FROM HOST NAME
36d
CHECK IF CLIENT IDENTIFICATION BELONGS TO A STOLEN ITEM ?
36e
YES
NO
SET IP ADDRESS TO "204.174.10.1"
36f
SET IP ADDRESS TO "204.174.10.16"
36g
USE IP ADDRESS TO FORM A RESPONSE TO DNS QUERY
36h
SEND RESPONSE TO CLIENT
36i


38
ENCODED CLIENT IDENTIFICATION
YYMMDDHHMMSS.XXXXXXXX.ipgrdx.as.com
DATE AND TIME 37
DOMAIN NAME 39

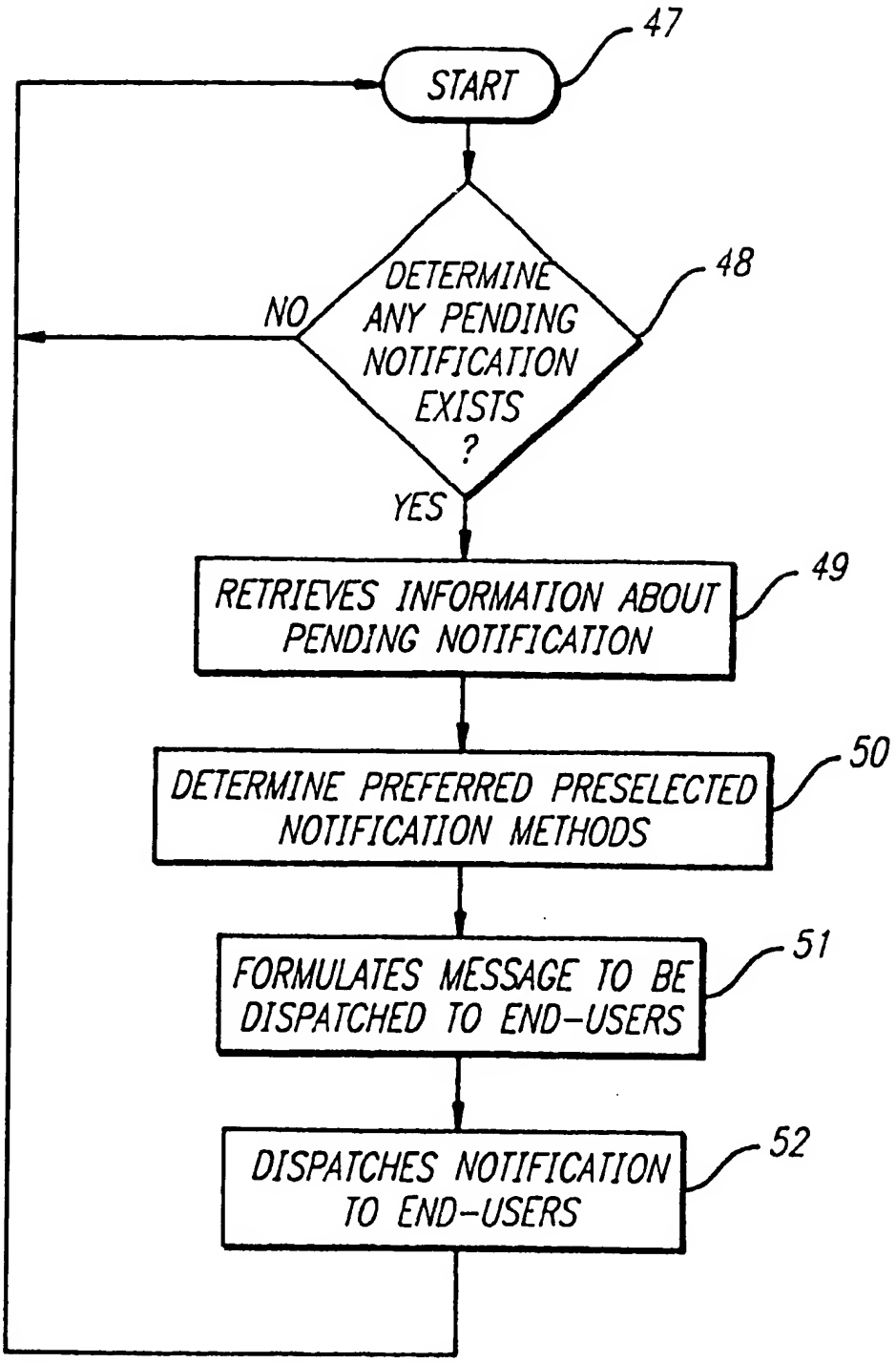

47
START
DETERMINE ANY PENDING NOTIFICATION EXISTS ?
48
NO
YES
RETRIEVES INFORMATION ABOUT PENDING NOTIFICATION
49
DETERMINE PREFERRED PRESELECTED NOTIFICATION METHODS
50
FORMULATES MESSAGE TO BE DISPATCHED TO END-USERS
51
DISPATCHES NOTIFICATION TO END-USERS
52

FIG. 12

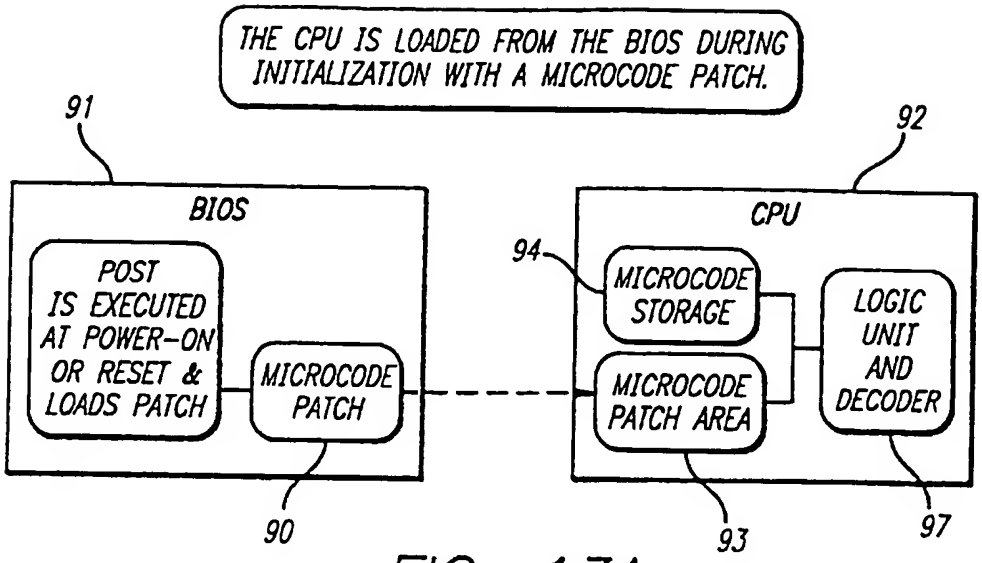


FIG. 13A

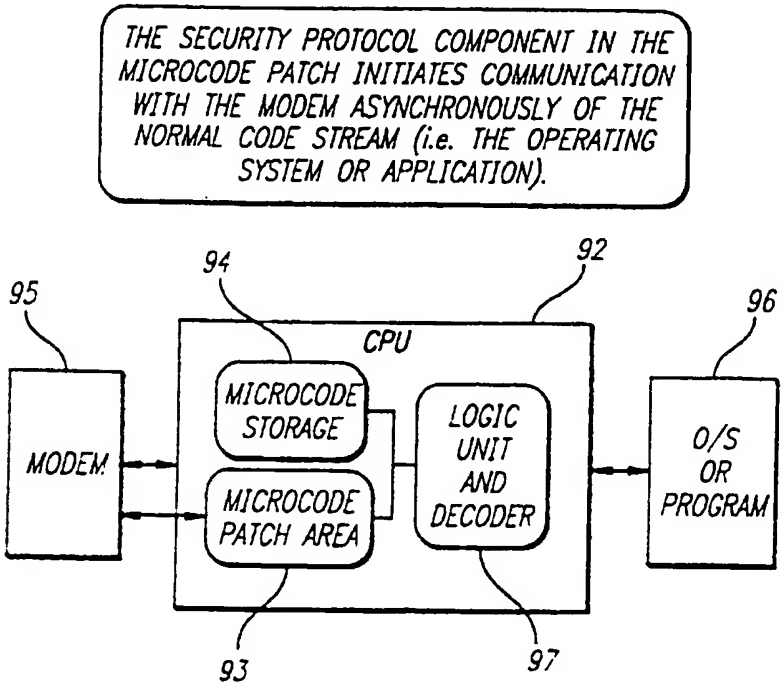


FIG. 13B